What is Parkinson's Disease?

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What is Parkinsonism?

- A patient who has 2/4 of the following features is said to have *Parkinsonism*
  - Bradykinesia (slowness of movement)
  - Rigidity (stiffness)
  - A tremor at rest
  - Postural instability (falls)

What Causes Parkinsonism?

- Strokes
- Infections (Von Economo's encephalitis)
- Tumors
- Medications/ Drugs
  - Heart Medications
  - Antipsychotics
  - Antinausea
  - MPTP
- Metabolic/Wilson's disease in young
- Trauma (i.e. Boxers)
- Normal Pressure Hydrocephalus
- Degenerative Disease

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What is a Degenerative Disease?

- Disease of the brain itself in which parts of the brain deteriorate (or degenerate) over time
  - Deterioration of nerve cells leading to cell death
- Most *common* degenerative disease that causes Parkinsonism is **Parkinson's disease**

> **Other Causes of Parkinsonism**
> Progressive Supranuclear Palsy
> Corticobasal degeneration
> Multiple systems atrophy
> Lewy Body disease
> Alzheimer's with Parkinsonism

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Introduction

AN
ESSAY
ON THE
SHAKING PALSY.

CHAPTER I.
DEFINITION–HISTORY–ILLUSTRATIVE CASES.

SHAKING PALSY. (*Paralysis Agitans.*)

Involuntary tremulous motion, with lessened muscular power, in parts not in action and even when supported; with a propensity to bend the trunk forward, and to pass from a walking to a running pace: the senses and intellects being uninjured.

Historical Evidence: Descriptions in Ancient Indian Medical Literature

- "Kampavata"
  - *Kampa* - shaking
  - *Vata* - lack of muscular movement

Mucuna pruriens

Parkinson's Disease – Epidemiology

- Prevalence (percentage of the population who has the disease at a single point in time) is approximately 0.3% in those 40 years of age and older
  - 7.5 million people worldwide are affected
  - Prevalence rises with age
    - 0.04% for ages 40 to 49 and 1.9% for ages 80 and older
  - Estimated that 9 million people with PD by year 2030
- Appears to be more common in the U.S.
  - Patients live longer?
  - Better medical care?
- More common in males than females (3:2)
  - More head trauma in men?
  - Estrogen may be protective

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Symptoms

| Features of Parkinson's Disease	
Motor	**Non-Motor**
Bradykinesia	Alteration in memory, mood, and thinking (neuropsychiatric)
Rigidity	Sleep Disorders
Tremor	Autonomic Symptoms
	Gastrointestinal Symptoms
	Sensory Symptoms
Postural Instability	

Parkinson's Disease

- How does PD develop?
  - There is a loss of brain cells that produce dopamine, a chemical, in a specific area of the brain, the *substantia nigra*
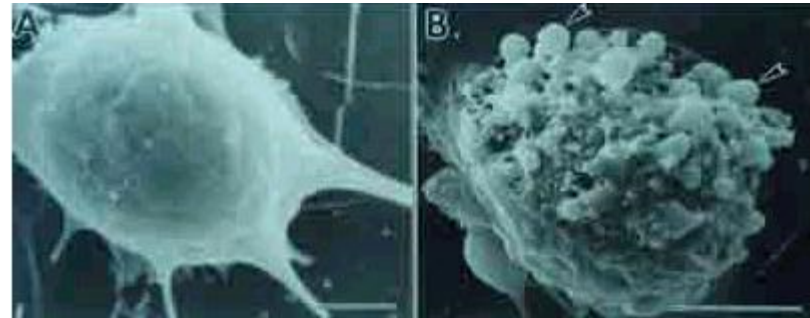

Parkinson's Disease   Normal
Substantia nigra
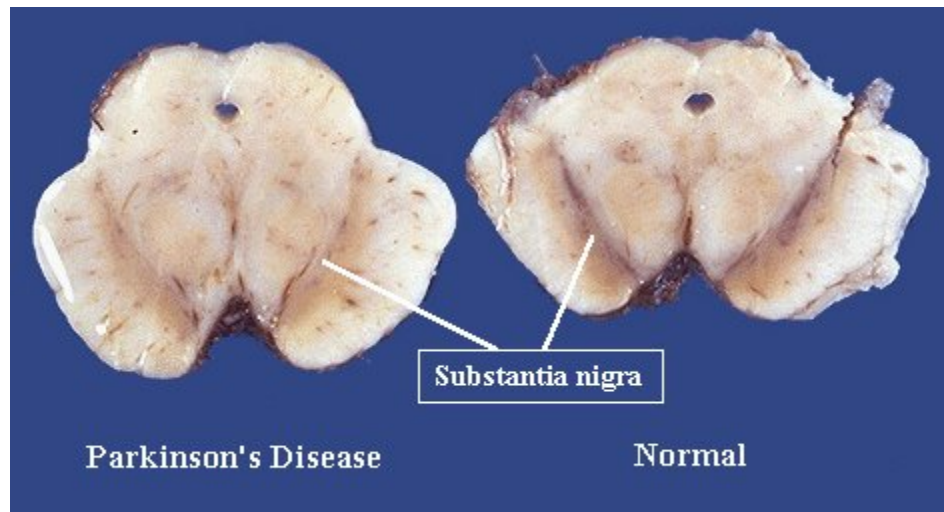
Parkinson's Disease

- ## How does PD develop?
  - The disease affects multiple other brain chemicals (serotonin, noradrenaline) and multiple areas of the brain
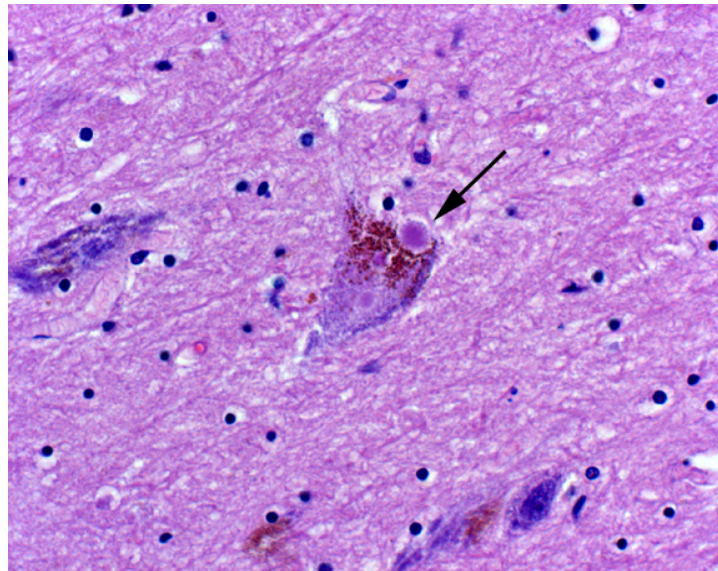
What Causes Cells to die?

- The cause of neurodegeneration involves programmed cell death (apoptosis)

- 0.5 percent of neurons in normal brain undergo apoptosis - 2 percent in those with PD

- Likely involves a cascade of events including
  - abnormalities in protein processing
  - oxidative stress
  - mitochondrial dysfunction
  - inflammation
  - lack of growth factors

Parkinson's Disease: Protective Factors and Risk Factors

- **Protective Factors**
  - Smoking
  - Caffeine intake
  - Vigorous exercise

- **Definite Risk Factors**
  - Family history
  - Age

Parkinson's Disease: Protective Factors and Risk Factors

- **Protective Factors**
  - Smoking
  - Caffeine intake
  - Vigorous exercise

- **Potential Risk Factors**
  - Concussion
  - Midlife migraine with aura
  - Living in urban areas
  - Rural areas-pesticide
  - Excess body weight
  - Higher levels of education
  - Lower muscle strength in adolescence
  - High dietary consumption of iron and manganese
  - Melanoma and prostate cancer

Genetics

- 20-25 percent of patients with sporadic PD have at least one first degree relative
  - Having a family member of PD is more likely when age of onset is less than 50 years
- First degree relatives are 2.3 times as likely to develop PD

Parkinson's Disease

- Genes and Parkinson's
  - Several genes have been identified that cause parkinsonism (familial forms)
 - Other genes may not cause Parkinson's, but increase risk
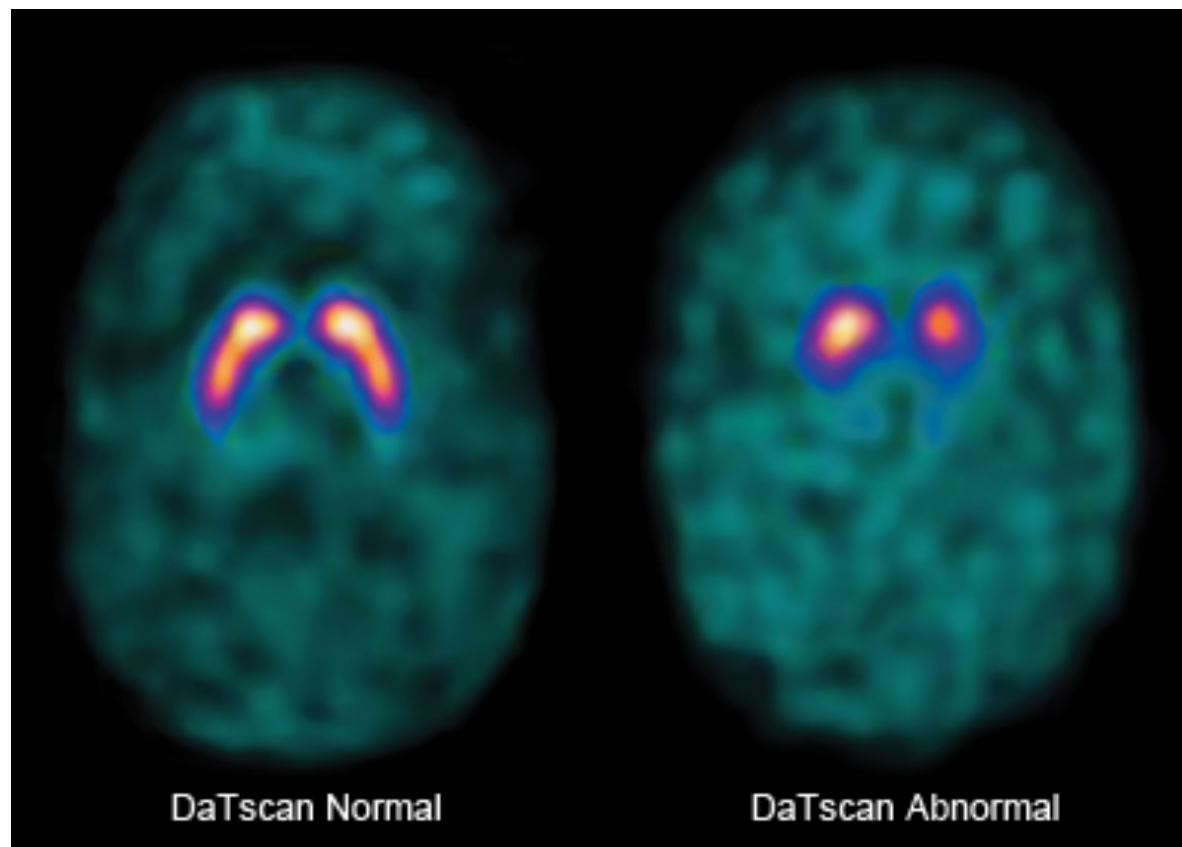
Parkinson's Disease – Diagnosis

- Parkinson's is a clinical diagnosis
  - Diagnosis can only be proven by a brain biopsy, done at autopsy

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Parkinson's Disease – Diagnosis

- If this is so, then why do we order MRI or brain, CT scan, etc.?

Parkinson's Disease – DaTscan

DaTscan Normal   DaTscan Abnormal
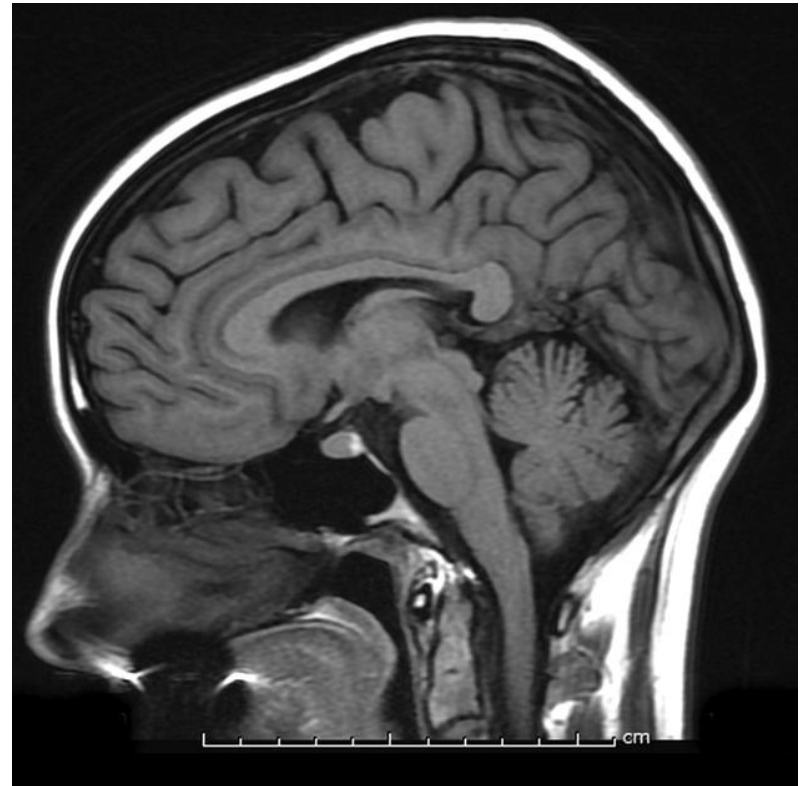
Parkinson's Disease – DaTscan

- **Can** reliably distinguish essential tremor from Parkinsonian syndromes (Parkinson's disease, lewy body disease, MSA, etc.)

- **Cannot** distinguish Parkinson's disease from other parkinsonian syndromes

- Subject to interpretation and is not 100 percent sensitive (although very high at 97%)

- Useful when patients have an atypical tremor or other signs such as bradykinesia, rigidity, etc. are questionable

- **Not** useful in clinically obvious cases

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Parkinson's Disease Future

- Studies underway to help predict outcomes
  - DodoNA project
- Personalized Medicine